Washington University School of Medicine
Digital Commons@Becker

Independent Studies and Capstones

Program in Audiology and Communication Sciences

1981

Physical education and the hearing impaired

Lesley K. Wilke

Follow this and additional works at: http://digitalcommons.wustl.edu/pacs_capstones

 Part of the Medicine and Health Sciences Commons

Recommended Citation

Wilke, Lesley K., "Physical education and the hearing impaired" (1981). *Independent Studies and Capstones*. Paper 539. Program in Audiology and Communication Sciences, Washington University School of Medicine.
http://digitalcommons.wustl.edu/pacs_capstones/539

This Thesis is brought to you for free and open access by the Program in Audiology and Communication Sciences at Digital Commons@Becker. It has been accepted for inclusion in Independent Studies and Capstones by an authorized administrator of Digital Commons@Becker. For more information, please contact engeszer@wustl.edu.

LIBRARY
CENTRAL INSTITUTE FOR THE DEAF

PHYSICAL EDUCATION AND THE HEARING IMPAIRED

an Independent Study

May, 1981

By: Lesley K. Wilke

Sponsor: Joan Garrison

FOR REFERENCE
LIBRARY
CENTRAL INSTITUTE FOR THE DEAF
NOT TO BE TAKEN FROM THIS ROOM
CAT. NO. 1935 LIBRARY BUREAU

TABLE OF CONTENTS

I INTRODUCTION

The motor abilities of hearing impaired children have been a concern of both educators of the hearing impaired and physical educators for many years. Teachers of the hearing impaired read literature indicating that the motor skills of hearing impaired children are inferior to normally hearing children (Boyd, 1967), and question the effect of this upon the child's classroom performance as well as his ability to compete on a physical level with hearing children his own age. Physical educators receive this information, and further information revealing that children deafened due to meningitis are significantly inferior in motor skills than children under any other etiological classification (Myklebust, 1960), and question their role in devising remedial programs to help these children.

Several studies have been done over the years that have determined that the hearing impaired are indeed inferior to normally hearing children in the area of motor skills (Myklebust, 1960; Boyd, 1967; Lindsey and O'Neal, 1976). There is little information on the effectiveness of a physical education program in improving these skills. The purpose of this study was to compare the performance of perceptual-motor skills of physically and mentally normal hearing impaired children who have participated in a comprehensive physical education program for one year to those who have not participated in a physical education program. This comparison was done on a selected population of hearing impaired children between the ages of two years, eleven months and five years, six months at Central Institute for the Deaf in St. Louis, Missouri.

II Literature on Physical Education for the Hearing Impaired

One of the first publications on physical education for the deaf was written by Margret Daly in 1913, and was entitled "Physical Training for the Deaf Child" (Daly, 1913). Daly proposed that the deaf may have more physical defects to overcome than the average hearing child, especially if there is a balance problem related to the cause of deafness. She maintained that the orally educated deaf need more vitality and better nerves to stand the strain of learning to talk and lipread, and this can be developed through a program of physical training. Daly believed there were two essential components of a physical training program for the deaf. The first component was that of rhythm training. This was accomplished through team games, marching activities, and aesthetic dancing. Daly felt this fostered good coordination and balance as well as providing an emotional release for the children. The second component Daly labelled "Formal Gymnastics" which was designed to instill good postural habits in the children as well as developing neuromuscular control. This was accomplished by commanding the children to imitate a variety of body positions and hold them for various lengths of time. Daly believed that this program of physical training should ideally be planned and supervised by someone trained in both physical education and deaf education. Realizing that it would be difficult to find someone with these qualifications, she encouraged periodic contact between the physical education teacher in charge of the program, and a teacher of the deaf. Daly maintained that participation in such a program helped to "thin the wall" (Daly, 1913) which silence has formed around the deaf child.

Edward Hines further defined the term 'gymnastics' in relation to deaf children in his article entitled "Physical Education" in 1914 (Hines, 1914). Hines used the term to mean systematic exercise of the muscles for the restoration of health, and for the development and preservation of physical powers (Hines, 1914). Hines believed that this type of training established vigor to let the mind work most effectively, as well as instilling important values in the children. Among these values were: sportsmanship, respect for the rights of the opponent and the spectators, and the importance of the team over any individual member. Hines placed the responsibility of the program's effectiveness entirely upon the teacher. He believed the quality of the work and the discipline of the class depended on the teacher's ability to observe rhythm, exactness and vigor of execution, and promptness and unison of response. Observation and development of these factors ensured a successful program.

By 1936, emphasis had moved from the physical training of the body and it's muscles, to the provision of a physical education and recreation program that would bridge the gap between deaf and hearing worlds. In an article published in 1936 entitled "Physical Education Has an Added Value for the Deaf", Anna Mellinger advocated the training of deaf children in athletic games so that they could play with hearing children on an equal basis. She felt that because the deaf lacked many other forms of recreation (music, television, etc.), it was important for them to participate in athletics. Mellinger believed a comprehensive physical education program was needed, not just a seasonal sports program. She felt that such a program was a mode for the deaf child to again respect and encouragement, as well as being an avenue into the hearing world. Mellinger maintained that there was a direct relationship between the acquisition of dance steps and the acquisition of language. She believed that learning to put tap dance steps into dance movements facilitated the transition from words to sentences.

Jean Dallet also emphasized the value of physical education for helping the deaf fit into the mainstream of society. In her article "Physical Education for the Deaf Child--Is It Worthwhile?" published in 1934, Dallet wrote that the ability

to enter into games and perform stunts establishes self-confidence in the children and prepares them to fit in at hearing schools, (Dallet, 1934). She believed that physical education fostered development in three areas: body, mind, and character. An improvement in the child's body resulted in an improvement in the child's carriage and the way he or she handled his/her body movements. An improvement in the mind of the child resulted in the child's appreciation of drill work and corrective exercise. Development in character occured when self reliance was fostered and mental and physical fear were overcome.

In an article entitled "Physical Training", in 1914, A.E. Guedel stressed the need for physical and intellectual training for the deaf in order to produce good citizens. Guedel believed that physical education brought mental recreation without a great expenditure of mental effort. He felt that that the deaf needed to develop a higher standard of physiological activity, and that this could be accomplished through competitive exercise.

In 1967, the area of emphasis changed once again, this time to the motor abilities of the deaf and how physical education could be used to improve these abilities. In his article entitled "Comparison of Motor Behavior in Deaf and Hearing Boys", written in 1967, John Boyd summarized his findings of a comparison between deaf and hearing boys on four motoric features (Boyd, 1967). These features were static equilibrium, locomotor coordination, psychomotor integration, and laterality. Boyd controlled etiology in his study, separating his subjects into the categories of prenatally orparanatally deaf (non-hereditary), hereditary deafness, and postnatally deaf (non-hereditary), in an attempt to establish a relationship between etiology and motor ability. Boyd used 90 deaf boys between the ages of 8 and 10 as subjects in his study. All had normal intelligence and were without physical disabilities, and all had hearing threshold levels of 65dBSPL or greater with a mean threshold of 80-90dBSPL. Boyd used three different measures to evaluate the motor abilities of his subjects. To evaluate static equilibrium and locomotor coordination, he used two subtests of the Oseretsky Scale of Motor Ability. To evaluate psychomotor integration (kinesthetic functioning and speed), Boyd used the Van Der Lugh Psychomotor Series for Children. Finally, Boyd used the coding subtest of the Wechsler Intelligence Scale for Children to evaluate laterality. Boyd's results revealed the following information: On the feature of static equilibrium, Boyd found a significant difference between the hearing and deaf, which he attributed to some type of vestibular, cerebellar, or central nervous system impairment in the deaf subjects. However, some of the deaf subjects performed as well as the hearing, so Boyd did not propose any generalizations. On the test for locomotor coordination, Boyd found no significant difference at 8 years, but found a significant difference at 9 and 10 years. Boyd presumed a cumulative effect of the lack of audition with equilibrium and coordination problems, and questioned whether this resulted in a slower rate of maturation. When evaluating psychomotor integration, Boyd found several types of results. On the test for kinesthetic memory, Boyd found the deaf subjects attained higher than average scores. They seemed to be using kinesthesia in a compensatory manner, and Boyd questioned whether there is a shift in the use of other sensory modalities in the presence of sensory deprivation. On the test for kinesthetic control of force and speed, the hearing subjects did significantly better than the deaf, which Boyd felt was because hearing aided the task itself. On the test for overall speed, Boyd found no difference between hearing and deaf subjects. Results from the evaluation of laterality showed 30% of the hereditary deaf preferring their left hand which led Boyd to raise the question, is there a genetic link between deafness and sinistrality? (Boyd, 1967). When Boyd compared the motor abilities of the three etiological groups, Boyd found no significant difference on any of the features except speed. The performance of

subjects in the hereditary group was superior to the performance of subjects in the prenatal non-hereditary group. Boyd did not make any conclusive statements based on this information.

In 1976, Dianne Lindsey and Janet O'Neal published the results of a study to compare 8 year old hearing and deaf children on a battery of static and dynamic balance tests. The article was entitled "Static and Dynamic Balance Skills of Eight Year Old Deaf and Hearing Children" (Lindsey and O'Neal, 1976), and the study was done as a follow-up to Boyd'd study in 1976. Lindsey and O'Neal used 31 physically and mentally normal 8 year old deaf children and 77 mentally and physically normal 8 year old hearing children as subjects. The deaf children had hearing threshold levels of 65dBSPL or greater, while the hearing children had hearing threshold levels of 25dBSPL or better. The battery included tests from several sources (Oseretsky Tests of Motor Proficiency, Development Sequence Perceptual-Motor Tasks, Meeting Street School Screening Test, and Seashore's Beam Walking Test), and was administered by a physical therapist and recorded by another physical therapist. Because the children communicated with Total Communication, an interpreter was used to relay the message from the examiner to the subjects. The findings of the test were as follows:

1) Deaf children failed significantly more tests on both static and dynamic skills than did the hearing children.
2) This relationship existed independent of the race and sex of the child, only the variable of hearing status was found to relate significantly to the study.
3) Elimination of visual input on static balance tests increased the difficulty of the task for both hearing and deaf, but more seriously impaired the deaf. (Lindsey and O'Neal, 1976).

Thus, Lindsey and O'Neal confirmed the results of Boyd, with the exception of the area of dynamic skills where Lindsey and O'Neal found the deaf were deficient. Before designing remedial programs in physical education to hopefully eliminate these deficits, Lindsey and O'Neal believe the following research must be done:

1) Development of screening tests that are age appropriate and measure motor ability.
2) Development of specific remedial activities aimed at direct intervention with individual motor and balance deficits.
3) Determination of the earliest age at which motor and balance deficits in deaf children can be detected.

Once remedial programs are enacted for the deaf children, Lindsey and O'Neal stress research to gather information about the following:

1) Whether or not motor and balance deficits of the deaf can be eliminated, improved, or reversed by remedial intervention.
2) Which corrective programs are most effective in treating motor and balance disabilities.
3) Which etiologic groups of deafness respond best, least, or not at all to remedial intervention.
4) Whether or not an intervention program introduced at an early age could eliminate or reduce these potential motor and balance deficits.

In 1979, Lou Penella examined the role of physical education as a remedial program to meet the special needs of deaf children in the area of motor ability (Penella, 1979). He believes educators should devise precise methodologies aimed at eliminating motor deficits. Balance, which includes both equilibrium and kinesthesis, is essential for successful participation in physical activity and sports. According

to Pennella, there is little emphasis on measurement and training for improvement of balance. Balance is maintained through a complex sensory apparatus including vision, proprioceptors in the body ligaments, the organs of touch, and the semicircular canals of the inner ear. If deafness is accompanied by damage to the semicircular canals, as in children deafened due to meningitis, the individual will have difficulty maintaining equilibrium. Pennella believes physical educators should develop a curriculum for each individual child depending on the cause of deafness and the anatomical structures which may be affected. For those whose semicircular canals have been damaged, a physical education program should emphasize the vision and touch proprioceptors which can compensate for the impaired canals. Pennella believes that Public Law 94-142 and the use of individualized education program, if developed and utilized, can render diagnostic and prescriptive procedures needed for the improvement of instruction in physical education. He offers the following suggestions for program implementation:

1) Assessment and testing of student's motor ability.
2) Provision of activities that will have an ameliorating effect on the total motor ability of students.
3) Provision of activities that promote the training of balance, equilibrium, and kinesthetic development. (Pennella, 1979).

Pennella concludes his article by advocating a comprehensive physical education, intramural, recreation and athletic program conducted by certified physical education teachers from preschool through high school to provide progressive improvement in all areas of motor ability (Pennella, 1979).

III Assessing the Motor Abilities of Young Hearing Impaired Children

This study addresses three specific questions:

1) Are there differences in perceptual-motor abilities between hearing impaired children who have been involved in a physical education program and hearing impaired children who have not?
2) If there is a difference, does this difference remain or disappear over time when the children previously without physical education begin a program of instruction?
3) Do young children deafened by meningitis demonstrate a lower level of motor skills than young hearing impaired children with other etiologies?

Sample

There were ten hearing impaired boys and five hearing impaired girls in the experimental group, all enrolled at Central Institute for the Deaf in St. Louis, Missouri. All the children were of normal intelligence as measured on the Randall's Island Performance Series. The children had a hearing loss of 70 dB or greater for the speech range in the better ear, and speech frequency averages ranged from 73 dB to 118 dB; indicating that these children were severely to profoundly deaf or profoundly deaf. Three of the children had an etiology of meningitis, three of heredity, and nine had an unknown etiology.

The children were divided into two groups. Group A consisted of children between the ages of two years, eleven months and five years, six months who were in their first year at Central Institute and had not participated in a physical education program. Group B consisted of children between the ages of three years, eleven months and five years, seven months who were in their second year at Central Institute and had participated in the physical education program there the year before. The program consisted of two twenty minute physical education classes per week for nine months.

It is possible that the age of the children effected the performance of the groups, since the children in Group B were slightly older than the children in Group A. However, to ensure that all the children received the same type of instruction in physical education, they were all taken from the same school, and the age difference was unavoidable.

A description of the study population by age and sex is shown in Table 1.

TABLE 1
Description of the Study Population by Age and Sex

	Males	Females
Group A		
2-11 to 3-11	5	1
3-11 to 4-11	—	—
4-11 to 5-11	1	—
Group B		
2-11 to 3-11	1	—
3-11 to 4-11	2	3
4-11 to 5-11	1	1

Method

Test Battery

The battery of tests used to evaluate the children was adapted from a checklist of perceptual-motor skills composed by J. Tillman Hall, Nancy Hall Sweeney, and Jody Hall Esser. (Hall, Sweeney and Esser, 1980). It was designed as a teacher rating form for instruction and evaluation of perceptual-motor skills at the elementary school level. Each child was required to perform twenty-two motor tasks and was rated according to a set of criteria appropriate to each task. The twenty-two test items were chosen because:

1) They are appropriate for the evaluation of early perceptual and motor development of preschool and elementary aged children. The core of development at this age is movement, and the level of a child's perceptual-motor ability is reflected in his ability to coordinate his perceptions with his movements and explore his environment.
2) They are non-verbal tasks and easy to demonstrate.
3) They can be administered relatively quickly (10-15 minutes).
4) They require easily accessible and transportable testing materials.
5) They are criterion referenced, that is, they describe skills that can be taught to the child.

The test items were divided into four categories; locomotor skills, balance, awareness of body and space, and hand-eye coordination. Hall, Sweeney, and Esser define the categories as follows:

1) Locomotor Skills. The child's general coordination and locomotor skill development.
2) Balance. The ability of the body to maintain a stationary position or perform purposeful movements while resisting the force of gravity known as balance.
3) Awareness of Body and Space. The child's awareness of the ways in which the body or parts of it can be controlled, moved or balanced; and his ability to move through space freely or in a directed manner.
4) Hand-Eye Coordination. The child's ability to move the hand(s) toward something the eyes see and to make contact with that object. (Hall, Sweeney, and Esser, 1980, pp. 18-19.)

Table 2 provides a listing of individual test items.

TABLE 2
Test Items and Their Classification

Item No.	Description	Classification
1	Walk forward 10 ft.	Locomotor Skills
2	Walk backward 10 ft.	
3	Run forward 25 ft.	
4	Hop on one foot	
5	Hop on other foot	
6	Jump forward 10 ft.	
7	Jump off 12" height, land on feet	
8	Stand on one foot for 5 sec., Eyes open, arms out	Balance
9	Stand on other foot for 5 sec., Eyes open, arms out	
10	Walk forward on a 2" wide line	
11	Walk backward on a 2" wide line	
12	Walk sideways on a 2" wide line	
13	Catch on one bounce an 8" ball Thrown from 5 ft.	Hand-eye Coordination
14	Stop 8" ball rolled from 10 ft.	
15	Point to head	Awareness of Body & Space
16	Point to shoulders	
17	Point to knees	
18	Raise one arm, then the other	
19	Lean forward	
20	Lean backward	
21	Twist head	
22	Tilt head	

Administration of the Tests

The tests were administered and the results recorded by a graduate student in Education of the Hearing Impaired at Central Institute for the Deaf - Washington University in St. Louis, Missouri. All of the subjects were tested individually in the gymnasium at Central Institute. The examiner demonstrated the task, twice if necessary, and indicated that the subject was to imitate by pointing to him/her. The children were given three attempts to correctly accomplish each task, and were given verbal reinforcement and praise for correct performance throughout the test.

Groups A and B were tested at the beginning of October to determine only initial differences in motor abilities. Both groups were retested in March-April (after Group A had received five months of initial instruction in physical education and Group B had received five months of additional instruction) to determine whether this difference remained or disappeared.

Results

Performance of Group A vs. Performance of Group B

Data gathered in October indicated that on some test items, there was a difference between the motor abilities of children who had participated in a physical education program (Group B) and those who had not (Group A). In the area of locomotor skills, Group A was inferior to Group B on item #2, which required the child to walk backward, and item #6, which required the child to jump forward. In the area of balance, which exhibited the greatest amount of disparity, Group A was inferior to Group B on three of the five test items. These items required the child to stand on one foot (item #8), walk forward on a 2" wide line (item #10) and walk backward on the same line (item #11). In terms of hand-eye coordination, Group A was inferior to Group B on item #13, which required the child to catch a ball after one bounce. Both groups displayed excellent skills in the area of awareness of body and space, with the exception of item #18 which one child in Group A failed. Table 3 displays the results of test items on which the performance of Group A was inferior to the performance of Group B.

TABLE 3

a.) Number and Percentage of Hearing Impaired Children Performing Locomotor Test Items

		Group A		Group B	
Item. No.		#	%	#	%
2	Completes task	6	86	8	100
FAIL	Wanders in path	1	14	—	—
FAIL	Stumbles or falls	—	—	—	—
6	Completes task	5	71	7	88
FAIL	Can't keep feet together	2	29	1	12

b.) Number and Percentage of Hearing Impaired Children Performing Balance Test Items.

		Group A		Group B	
Item No.		#	%	#	%
8	Completes task	2	29	8	100
FAIL	Sways	5	71	—	—
FAIL	Must move weight bearing foot	—	—	—	—
10	Completes task	3	43	5	62
	Pauses often	—	—	—	—
FAIL	Must look at feet	—	—	3	38
FAIL	Steps off line	4	57	—	—
	Can't place one foot in front of other	—	—	—	—
11	Completes task	—	—	3	38
	Pauses often	1	14	—	—
FAIL	Must look at feet	1	14	3	38
FAIL	Steps off line	4	57	2	24
	Can't place one foot in back of other	1	14	—	—

c.) Number and Percentage of Hearing Impaired Children Performing Hand-Eye Coordination Test Items.

		Group A		Group B	
Item No.		#	%	#	%
13	Completes task	2	29	6	76
FAIL	Can't complete task due to poor hand-eye coordination	5	71	2	24
FAIL	Does not watch ball	—	—	—	—

d.) Number and Percentage of Hearing Impaired Children Performing Awareness of Body and Space Test Items.

		Group A		Group B	
Item No.		#	%	#	%
18	Child imitates	6	86	8	100
FAIL	Child hesitates	—	—	—	—
FAIL	Child moves wrong body part	1	14	—	—

Performance of Group A and Group B Five Months Later

To determine whether or not the initial difference in motor skills between the subjects in Groups A and B remained or disappeared over time, both groups were retested in March-April on the test items that the subjects in Group A were inferior on initially. Data gathered confirmed that the performance of subjects in Group A had improved on at least one test item in each area, but because the performance of the subjects in Group B had improved on these items and others, the performance of Group A was still inferior. Table 4 displays the performance of subjects in Group A and Group B in March-April on items which the performance of Group A was inferior to Group B in October.

TABLE 4

a.) Number and Percentage of Subjects in Group A and Group B Performing Locomotor Test Items in October and in March-April.

		Group A				Group B			
		Oct.		Mar.-Apr.		Oct.		Mar.-Apr.	
Item No.		#	%	#	%	#	%	#	%
2	Completes task	6	86	7	100	8	100	8	100
FAIL	Wanders in path	1	14	—	—	—	—	—	—
FAIL	Stumbles or falls	—	—	—	—	—	—	—	—
6	Completes task	5	71	5	71	7	88	7	88
FAIL	Can't keep feet together	2	29	2	29	1	12	1	12

b.) Number and Percentage of Subjects in Group A and Group B Performing Balance Test Items in October and March-April.

		Group A				Group B			
		Oct.		Mar.-Apr.		Oct.		Mar.-Apr.	
Item No.		#	%	#	%	#	%	#	%
8	Completes task	2	29	3	43	7	88	8	100
FAIL	Sways	5	71	4	57	—	—	—	—
FAIL	Must move weight bearing foot	—	—	—	—	1	12	—	—
10	Completes task	3	43	3	43	5	62	7	88
FAIL	Pauses often	—	—	—	—	—	—	—	—
FAIL	Must look at feet	—	—	1	14	3	38	1	12
FAIL	Steps off line	4	57	3	43	—	—	—	—
FAIL	Can't place one foot in front of other	—	—	—	—	—	—	—	—

TABLE 4 b.), cont'd.

Item No.			Group A Oct. #	Group A Oct. %	Group A Mar.-Apr. #	Group A Mar.-Apr. %	Group B Oct. #	Group B Oct. %	Group B Mar.-Apr. #	Group B Mar.-Apr. %
11		Completes task	—	—	—	—	3	38	5	62
		Pauses often	1	14	—	—	—	—	—	—
	LJ	Must look at feet	1	14	1	14	4	50	1	12
	FA	Steps off line	4	57	5	72	1	12	2	26
		Can't place one foot in back of other	1	14	1	14	—	—	—	—

c.) Number and Percentage of Subjects in Group A and Group B Performing Hand-Eye Test Items in October and in March-April.

Item No.			Group A Oct. #	Group A Oct. %	Group A Mar.-Apr. #	Group A Mar.-Apr. %	Group B Oct. #	Group B Oct. %	Group B Mar.-Apr. #	Group B Mar.-Apr. %
13		Completes task	2	29	3	43	6	74	8	100
	LJ	Can't complete task due to poor hand-eye coordination	5	71	4	57	2	26	—	—
	FA	Does not watch ball	—	—	—	—	—	—	—	—

d.) Number and Percentage of Subjects in Group A and Group B Performing Awareness of Body and Space Test Items in October and in March-April.

Item No.			Group A Oct. #	Group A Oct. %	Group A Mar.-Apr. #	Group A Mar.-Apr. %	Group B Oct. #	Group B Oct. %	Group B Mar.-Apr. #	Group B Mar.-Apr. %
18		Child imitates	6	86	7	100	8	100	8	100
	LJ	Child hesitates	—	—	—	—	—	—	—	—
	FA	Child moves wrong body part	1	14	—	—	—	—	—	—

Performance of Children With an Etiology of Meningitis Compared to the Performance of Children With Other Etiologies

Placing the subjects of both groups in categories according to etiology of deafness in October and again in March revealed that the children deafened by meningitis were inferior in motor ability to children with hereditary deafness and to children with an unknown etiology. In October the following results were obtained. In the area of locomotor skills, the meningitis children were inferior on item #4 (hopping on one foot), and item #5 (hopping on the other foot). The greatest disparity occurred in the area of balance, where meningitic children were inferior on four of the five items (items #8, #9, #10, #11). In the area of hand-eye coordination, these children were inferior on item #13 (catching a ball on one bounce). Their performance in the area of awareness of body and space was not inferior to the subjects in the other etiological categories. Table 5 displays the results of test items on which the performance of children with an etiology of meningitis was lower than that of children with other etiologies.

TABLE 5

Number and Percentage of Test Items Completed Correctly by Subjects in Three Etiological Categories - October

		Meningitis N=4		Heredity N=3		Unknown N=9	
Item No.	Item Classification	#	%	#	%	#	%
4	Locomotor Skills	1	33	1	34	4	44
5		0	0	1	34	3	33
8	Balance	1	33	3	100	7	78
9		0	0	1	34	1	11
10		1	33	1	34	5	56
11		0	0	1	34	2	22
13	Hand-eye Coordination	1	33	2	66	6	67

When the subjects were retested in March-April, all of their performances had improved, but the subjects in the etiological category of meningitis were still lower on some test items. These test items and the accompanying results are shown in Table 6.

TABLE 6

Number and Percentage of Test Items Completed Correctly by Subjects in Three Etiological Categories - March-April.

		Meningitis N=4		Heredity N=3		Unknown N=9	
Item No.	Item Classification	#	%	#	%	#	%
4	Locomotor Skills	2	66	2	66	7	78
5		1	33	2	66	6	77
8	Balance	1	33	3	100	7	78
9		1	33	3	100	6	67
10		2	66	2	66	7	78
11		0	0	2	66	3	33
13	Hand-eye Coordination	1	33	2	66	8	89

Conclusions

Within the limits of this study, the following conclusions seem justifiable:

1) Young hearing impaired children who have participated in a physical education program for one year demonstrate superior skills in some areas of motor ability over children who have not participated, even after the children who have not previously participated begin a program of instruction.
2) After five months of instruction in physical education, all of the children demonstrated improvement in some areas of motor ability.
3) The children classified under the etiology of meningitis demonstrated inferior skills in some areas of motor ability when compared to children with hereditary deafness or an unknown etiology.
4) All of the hearing impaired children tested demonstrated the least amount of skill in the area of balance, which confirms the findings of previous research (Boyd, 1967; Lindsey and O'Neal, 1976).

IV Implications

There is still uncertainty about how and to what extent deafness effects the motor abilities of hearing impaired children at all ages. More quantified information is needed in this area. In terms of defining the benefits of a comprehensive physical education program upon the motor abilities of hearing impaired children, this study is only a beginning. More pilot studies are needed to investigate this concept with an effort to control the following variables:

1) Age and sex of the children.
2) The degree of hearing impairment of the children.
3) The etiology of deafness of the children.
4) The type and amount of instruction in physical education the children are given.

The results of this study do lead both educators of the hearing impaired and physical educators to feel encouraged; something can be done to raise the skill level of hearing impaired children in the areas of motor ability. A teacher rating form such as the one used in this study is needed to assess each child's strengths and limitations in the areas of motor ability as he enters a program of physical education, and as he participates in it daily. In this way, the teacher can meet each child's specific needs by choosing activities appropriate for him/her, as well as determining how much extra time and help the child will need to bring his performance to an acceptable level.

References

1. Boyd, John, "Comparison of Motor Behavior in Deaf and Hearing Boys," American Annals of the Deaf, 112:598-605, 1967.

2. Dallet, Jean, "Physical Education for the Deaf Child - Is It Worthwhile?," Volta Review, 36:331-335, 1934.

3. Daly, Margret A., "Physical Training for the Deaf Child," Volta Review, 15:131-136, 1913.

4. Guedel, A.E., "Physical Training," American Annals of the Deaf, 59:172-180,1914.

5. Hall, J. Tillman; Sweeney, Nancy Hall; and Esser, Jody Hall, Physical Education in the Elementary School. Santa Monica, California: Goodyear Publishing Company Inc., pp. 18-39.

6. Hines, Edward J., "Physical Education," Volta Review, 16:248-250, 1914.

7. Lindsey, Dianne and O'Neal, Janet, "Static and Dynamic Balance Skills of Eight Year Old Deaf and Hearing Children," American Annals of the Deaf, 121:49-55, 1976.

8. Mellinger, Anna, "Physical Education Has An Added Value For the Deaf," Volta Review, 36:335-336, 1934.

9. Myklebust, H.R., The Psychology of Deafness. New York: Grune and Stratton, Inc., pp. 180-203, 1960.

10. Pennella, Lou, "Motor Ability and the Deaf:Research Implications," American Annals of the Deaf, 124:366-371, 1979.